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| Date : 10-04-2018 (9 AM) | **9** |

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**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**B.Sc. PHYSICS - IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2018**

**PH 415: Optics, Electricity and Semiconductor Diodes**

(For supplementary candidates)

**For 14PMC2427 and 2015 batch candidates**

Do not write the register number on the question paper

Please attach the question paper along with the answer script.

**Time : 1 ½ hrs Max Marks : 35**

This paper contains two printed pages and three parts

**PART- A**

Answer any **THREE** of the following  **(3 x 8 = 24)**

1. With a neat diagram explain the construction and working of He-Ne Laser. (8)

2. Explain different types of optical fibres, mention their advantages. (8)

3. a) With the necessary circuit diagram, describe the working of a bridge rectifier.

 b) Derive an expression for ripple factor of the above mentioned rectifier. (5+3)

4. Derive expressions for the resonant frequency and impedance at resonance of parallel     resonance circuit with resistance in the inductance arm. (8)

 **PART-B**

Solve the following **(2 x 4 = 8)**

5. A condenser of 1µF is charged and discharged through a high resistance. If half the     charge leaks in half a minute, calculate the value of the high resistance.

**OR**

 A half wave rectifier is employed to supply 45V dc. If the resistance of the diode is 20Ω     and the load resistance 530Ω, what should be the ac voltage at the secondary of the     transformer?

6. Calculate the V-number for a fibre of the core diameter 40µm and with the refractive      indices of core and cladding of 1.55 and 1.50 respectively. The wavelength of      propagating wave is 1400Å.Calculate the number of modes that the fibre can support.

**OR**

     The average output power of laser source emitting laser beam of wavelength 6328Å is      5mW. Find the number of photons emitted per second by the laser.

 PH- 415: A - 18

**PART-C**

Answer any **THREE** of the following **(3 x 1 = 3)**

7. a) Why glass is used for making optical fibres?

b) It is difficult to achieve laser action in X-rays. Why?

c) How the time constant of LR circuit can be increased?

d) Why in an ac circuit containing capacitor or inductor the power consumed is zero? e) Does a p-n junction possess capacitance? Explain.

PH415: A - 2018